

Enhancing Student Learning Through Innovative Teaching and Technology Strategies

**A University of Minnesota Proposal
to the Bush Foundation**

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EXECUTIVE SUMMARY

The University of Minnesota requests support for a program to foster the development of faculty perspectives and skills for integrating innovative teaching practices, including new developments in technology-enhanced learning, to address problems of student learning. The proposed program extends a long history of faculty development initiatives in innovative teaching and learning, supported in part by the Bush Foundation, and adds to recent University investments in technology-enhanced learning.

This initiative reflects the documented needs of University faculty members and the growing body of research findings attesting to the efficacy of faculty development programs that emphasize multiple strategies to meet instructional goals and enhance active engagement in learning. In a recent extensive needs assessment, faculty across the four campuses of the University identified common student learning problems, which were substantiated by students themselves in a parallel survey. Student learning problems ranged from too little time devoted to mastering course material to inadequate preparation for assignments and tests. These results are consistent with findings at other institutions.

Faculty members responding to the survey expressed a desire to learn more about diverse learning styles and also about the process of designing and delivering instruction, including web-based course instruction, enhanced lectures, active learning techniques, and multi-media teaching tools. Among possible forms of delivery, faculty preferred workshops jointly led by teaching and learning specialists and faculty, discussion groups on web-based resources and techniques, and small grants for individual and group development. Mid-career faculty expressed especially strong interest in these opportunities. These faculty preferences accord remarkably with characteristics of successful faculty development programs reported in the published literature.

The proposed program draws upon lessons from the literature: the program will be faculty-led; it will draw selectively upon campus-based resources in training for specific innovative teaching strategies and web-based instruction; it will require sustained involvement, rather than short-term skill-building; it will foster active participation in the evaluation of the impact of re-designed courses; and it will facilitate dissemination of successful models of integrated instructional designs. Faculty committees from each of the four campuses created the plan, working collaboratively under the leadership of an all-University faculty steering committee and with final review and endorsement from the Academy of Distinguished Teachers and the Senate Committee on Educational Policy.

Implementation plans across the four University campuses reflect differences in faculty roles and instructional programs. Although the plans vary slightly, several common themes unite them:

- A multi-phase developmental process that begins with identifying and clarifying individual problems and goals, followed by consideration of alternative instructional strategies and the most effective ways of combining them.
- A peer-based approach, in which faculty members participate in collaborative groups, with support and consultation from experts on teaching and learning and technology-enhanced learning.
- A student-centered approach, in which student learning problems are primary to course design, delivery, and evaluation.
- A learner-to-mentor progression, in which faculty participants disseminate their knowledge to subsequent participants and other colleagues.

The target audience for these programs is faculty who have already have had a number of years of teaching experience and who want to expand their repertoire to include innovative teaching and technology strategies. Particular attention will be paid to the recruitment of mid-career faculty, who have the

experience of observing student learning problems, the ability to generate solutions to them, and the stature to influence peers in applying agreed-upon solutions. Faculty participants will organize themselves in various collaborative groupings to analyze instructional goals, to address student learning difficulties, and to create alternative teaching strategies. Consultation in teaching and learning strategies and in web-based instruction will be available to individuals and small groups. Participant faculty will disseminate their newly acquired expertise to colleagues, thus sustaining and multiplying the impact of the program for the future.

An extensively detailed evaluation plan incorporates four levels of program evaluation: participant reaction to the program, student-learning indicators, faculty behavior, and assessment of dissemination and sustainability of the program. Appropriate adjustments will be made to the plan to accommodate variations in program implementation across campuses.

The proposed program complements and extends current University faculty development in teaching and learning. The University fully intends to continue the activities of the proposed program beyond the timeline of grant.

The University requests \$330,000 for each of three years to support this effort.

OVERALL GOAL OF THE PROPOSAL

The goal of this proposal is to enhance student learning by developing faculty perspectives and skills in integrating innovative teaching strategies with new developments in technology-enhanced learning.

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THE PROBLEM AND OPPORTUNITY TO BE ADDRESSED

This proposal outlines a plan to support faculty in integrating innovative teaching practices, including technology-enhanced learning (TEL), to address problems of student learning. A needs assessment conducted early in 2000 showed that University of Minnesota faculty members are concerned with a variety of learning problems in their courses, ranging from students devoting too little time to mastering course material to a lack of student skills in writing and math. A growing literature documenting the experiences of other institutions now suggests that the most effective responses to the diverse learning problems of today require careful analysis of impediments to student learning in the context of instructor goals and course content along with the adroit integration of multiple strategies for effective teaching. In the proposed initiative, collaborative groups of faculty members, with consultation from experts in teaching and learning and web-based instruction, will pursue guided practice in analyzing, designing, and creating integrated solutions, including technological ones, to student learning problems.

The proposed program will fit well with the University's intensified efforts to improve undergraduate education, led by President Mark Yudof and Executive Vice President and Provost Robert Bruininks. The program is designed to complement existing faculty development programs, as well as draw upon the rich array of TEL resources that exist on all four campuses. This effort to further enhance the integration of teaching and technology in a comprehensive way is guided by the University's "Strategic Plan" for the use of innovative technology in teaching, developed by faculty and TEL experts with the support of the Provost's office. Support for these initiatives is evidenced throughout the University by surveys of deans,

administrators, and faculty and also by faculty reporting on the successful integration of technology into their teaching, as well as students reporting on the benefits from increased access to information and interaction with peers and instructors.

Throughout the system, expanded teaching and learning and technology centers work with faculty groups to provide a wide range of instructional development activities and training for faculty. Teaching and learning programs include the fall teaching enrichment offerings on the Twin Cities, Morris, and Duluth campuses, mid-career teaching programs in Morris and the Twin Cities, and the Bush Faculty Development Program for Excellence and Diversity in Teaching, which has experienced great success on all four campuses. The available resources include small project grants, free WebCT accounts, laboratory space, state of the art multi-media equipment and software, extensive libraries, electronic and print materials, multimedia presentations, individual and group consultations, and a variety of short and long-term workshops. Technology-related activities include Duluth's "TechFest" mini-conferences and week-long intensive "TechCamps," Crookston's workshops on WebCT Toolbook authoring software, and a collaborative evaluation project with the Office of Human Ecology on the Twin Cities campus.

The proposed program will be a faculty-led initiative drawing upon campus-based support services in teaching and learning and technology-enhanced learning on the four campuses of the University. Four common themes guide the current proposal:

First, the project will involve a **multi-phase developmental process**. Collaborative groups will begin by identifying and clarifying individual faculty problems and goals. Participating faculty then will consider accepted principles of instructional design in selecting from alternative strategies for addressing the identified problems (e.g., active learning, enhanced lectures, attention to diverse learning styles and/or cultural variations, and technology-enhanced learning) and conceptualize the most effective ways of combining them. During this phase, faculty will draw on expert consultants for help in mastering new skills for using these strategies effectively. In the final phase, trials of the emerging new approaches will be carried out and evaluated, and the results will be disseminated to other faculty members.

Second, activities on all four campuses will emphasize a **student-centered** approach, in which student learning problems are primary to course design, delivery, and evaluation. Student learning problems identified in recent University surveys include significant time constraints, inadequate skills preparation (math, reading, writing, study skills and note-taking), failure to complete reading assignments, and a lack of motivation to learn.

Third, the project will emphasize interdisciplinary, **peer-based** approaches to faculty development. Faculty members will lead collaborative groups, with support and consultation from experts on teaching and learning and web-based instruction. This approach has been shown to be a powerful change agent and is exemplified by the most recent Bush faculty development grant to our University, implemented in 1991 and renewed in 1994, and by the Mid-Career Teaching Program on the Twin Cities campus, modeled after the original Bush program.

Finally, the project will involve faculty members in a **learner-to-mentor progression**, not unlike the ongoing program from the last Bush faculty development grant. Faculty participants during the first year will be encouraged to mentor participants in subsequent years. In addition, participants will be encouraged to document the continued evolution of their courses after the initial trial and evaluation.

These program elements touch on some widely recognized challenges in faculty development today. One is the question of how best to facilitate the learning of an increasingly diverse group of students. The focus of the project on a consistently student-centered orientation to teaching and learning activities will lead to prototypes that can be valuable to other faculty members and institutions.

A further question is how best to increase sophistication and skills in varied teaching strategies among faculty members that presently lack these skills. Of particular interest are the large numbers of mid-career

faculty members at our University, who are likely to be especially responsive to skill development in the service of specific instructional goals. The proposed initiative will draw on successful experiences at the University in faculty development programs for mid-career faculty.

There is also the question of how to address the increasingly problematic gap between the potential of technology and its most effective applications in teaching and learning. This initiative will emphasize pedagogical principles and models for combining web-based instruction with other innovative teaching strategies to supplement, enhance, or supplant more traditional forms of instruction. Moreover, we will emphasize heretofore under-used applications of technology; for example, rather than using web-based instruction only to purvey information, some of the proposed activities will focus on uses of the web to enhance critical thinking, analysis, and application of knowledge. Instead of being driven by technology, programs will involve faculty in developing effective teaching and learning goals, strategies, and outcomes as a prerequisite for determining how best to integrate innovations, including technology, into their teaching.

In order to involve faculty in addressing these questions and planning a new proposal, the University Vice-President for Human Resources and Principal Investigator for the grant proposal, Carol Carrier, solicited volunteers from the ranks of experienced teaching faculty on all four campuses. In early Fall 1999, faculty working committees were formed at UM-Twin Cities, UM-Duluth, UM-Morris, and UM-Crookston and began to take up the challenge of determining how best to improve teaching and learning on a system-wide basis.

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NEEDS ASSESSMENT

Through Fall and Winter of the 1999-2000 academic year, the faculty working groups on each campus met regularly and also designated representatives for periodic system-wide conference call discussions. As the discussions progressed, working group members also consulted with administrators, individual colleagues, and faculty groups such as the Academy of Distinguished Teachers, a group of faculty who have won undergraduate, graduate, and professional teaching awards and who are actively engaged in efforts to improve academic outcomes in the U of M system. This process of idea and information gathering gradually led to very collaborative and well focused inquiries that asked undergraduates and faculty to identify learning problems, and faculty to specify desired sources of expertise and preferred development activities. This comprehensive needs assessment process helped planners identify key teaching and learning issues along with effective ways to assist faculty in addressing these issues.

PHASE ONE — PRELIMINARY INFORMATION

The first phase of the needs assessment formulated a range of potential ideas about faculty development, which were then refined into a faculty survey instrument. The faculty planning committees gathered information from a number of stakeholders, as recommended by University of Minnesota-Duluth authors Carlson, Hilsen, O'Brien, and Peterson-Perlman (1996) and by other relevant evaluation literature.

The Academy of Distinguished Teachers uses an electronic discussion format to provide ideas and insights on key teaching and learning issues. This group discussion also assisted in formulating a set of key questions asking about the characteristics, values, and behaviors of today's students, how students have changed over the last decade, and how to modify instructional strategies to respond to the changing characteristics of students.

Data from several previous needs assessments further refined ideas for a subsequent survey. Faculty responding to a survey conducted in Summer 1999 on the Twin Cities campus indicated a need for further understanding of student needs and for development activities on diverse learning styles, active and cooperative learning, technology-enhanced learning, enhancing lectures, and creating course syllabi.

Faculty on the Morris campus responding to a Faculty Survey in Fall 1999 reported overwhelming support for increased training in technology-enhanced learning, including web-based instruction. Other high interest areas included active learning; effective teaching in first year seminars, faculty-student research partnerships, understanding student learning patterns, meeting the needs of a diverse student population, and collaborative teaching and learning within and across disciplines.

When Duluth faculty were surveyed in Fall 1997, only 12% of those responding (34 of 282) said they used web-based course materials in their teaching. About a quarter said they used the web "sometimes" while well over half reported never using such materials.

A 1998 survey of Twin Cities undergraduate deans and key academic representatives from the Duluth, Morris and Crookston campuses revealed that administrators on all campuses supported the goal of incorporating the use of technology into instruction. However, all campuses also reported that the most significant barrier to meeting this goal successfully was the lack of ongoing individualized training and support for faculty. More recently, comments from the Academy of Distinguished Teachers and the responses from these surveys converged on several common themes: the need to understand current students better and the desire to use new teaching approaches, including web-based instruction, to meet student needs.

To supplement the information from surveys of faculty and administrators, approximately 500 students across three campuses were surveyed in December 1999 regarding the characteristics of classes and teachers they found the most satisfying and the needs they felt were not met. The results of this survey indicated that the characteristics of instruction most highly valued by students were: faculty availability, faculty enthusiasm, clear explanations by faculty, review sessions, and variety/balance in instruction. The greatest needs reported by students were clearer statements of expectations by faculty, graded assignments, improved lectures, students having more time to do academic work, and variety in instruction. These student responses carry several implications for faculty efforts to improve student learning: the importance of providing opportunities for students to interact with faculty as part of class activity; the need for faculty to make their expectations clear to students; the need to use varied types of instruction along with providing feedback to students on assignments; and the significance of student time pressures as an obstacle to successful learning.

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PHASE TWO — COMPREHENSIVE FACULTY NEEDS ASSESSMENT

The information gathered in Phase One was used in combination with findings from current faculty development literature to formulate a brief but highly focused survey instrument for faculty on all four campuses. The goal of this survey was to gather the broadest possible input from faculty to guide the formulation of a faculty development initiative. The survey was distributed via email to all faculty on the four campuses of the University in Winter 2000. The number of responses received by campus was as follows: Crookston - 19; Duluth - 128; Morris - 24; and Twin Cities — 498, making a total of 672 respondents out of approximately 2800 surveys mailed. (See Appendix for copy of survey instrument.) Respondents to the survey ranged across a wide range of academic areas and all the faculty ranks were well represented. The distribution of respondents across academic areas was as follows: Biological Sciences 6%, Social Sciences 12%, Physical Sciences and Engineering 16%, Humanities and General College 20%, Health Sciences 17%, Education 10%, Agricultural Sciences and Natural Resources 6%, Architecture and Human Ecology 5%, and Business, Public Affairs, and Law 8%. Distribution of respondents by faculty

rank was the Full Professor 43%, Associate Professor 30%, Assistant Professor 21%, and non-tenure track Assistant Professor, Lecturer, or Instructor 6%.

Table 1 shows the top problematic student issues as identified by faculty across the four campuses. The five top rated items are: student time constraints, student preparation in math, reading, and writing, students not doing reading or note-taking, student study skills, and student motivation. The top five items identified are identical across the campuses with the exception of one item on the Crookston survey. Crookston faculty identified "student performance on assignments and tests" as the fifth highest item, replacing "student time constraints," which was in the top five for all the other campuses.

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Table 1: Four-Campus Comparison of Mean Ratings by Faculty of How Problematic Student Issues Have Been in Their Classes During the Past Several Years

(1 = not at all problematic; 2 = somewhat problematic; 3 = very problematic)

Issues	Merged Data	Crookston	Duluth	Morris	Twin Cities
	N=672	N=19	N=128	N=24	N=498
Student time constraints	2.11	1.95	2.18	1.88	2.11
Students not doing reading or note-taking	2.00	2.53	2.09	2.18	1.94
Student preparation-math, reading writing	1.99	2.53	2.12	2.14	1.94
Student study skills	1.88	2.56	1.99	2.13	1.81
Student motivation	1.83	2.47	1.92	1.83	1.77

Student performance on assignments and tests	1.76	2.32	1.81	1.75	1.74
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Table 2 describes the areas identified by faculty as most helpful to learn more about. The top three items are web-based course instruction, active learning styles, and multimedia teaching tools. The top three areas are identical across campuses with two exceptions. The Morris faculty rated "diverse learning styles" in the top three and the Twin Cities faculty rated "enhancing lectures" in the top three.

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Table 2: Four-Campus Comparison of Mean Ratings by Faculty of How Helpful They Would Find It to Learn More in Selected Areas

(1 = not helpful; 2 = somewhat helpful; 3 = very helpful)

	Merged Data	Crookston	Duluth	Morris	Twin Cities
Options for learning about new areas					
	N=672	N=19	N=128	N=24	N=498
Web-based course instruction	2.08	2.26	2.08	2.15	2.07
Active learning styles	2.02	2.53	2.12	2.20	1.97
Multi media teaching tools	1.99	2.35	1.99	2.15	1.97
Enhancing lectures	1.97	2.21	1.96	1.60	1.98
Diverse learning styles	1.88	2.16	1.98	2.18	1.83

Table 3 reports faculty responses to a question asking how likely they would be to participate in a variety of faculty development activities. Responses varied more across the four campuses on this question than on any other. However, the top three activities: workshops led by teaching and learning specialists, workshops

led by faculty, and web-based resources and discussion groups, were all rated very highly. Crookston rated "activities for mid-career teachers" especially strongly, while Duluth and Morris rated "small grants for individual or group development" very highly.

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Table 3: Four-Campus Comparison of Mean Ratings by Faculty of How Likely They Would Be to Participate in Teaching and Learning Activities

(1 = Not likely; 2 = Somewhat likely; 3 = Very likely)

Teaching and Learning Activities	Four-campus	Crookston	Duluth	Morris	Twin Cities
	N=672	N=19	N=128	N=24	N=498
Workshops led by teaching and learning specialists	1.97	2.63	2.15	2.18	1.90
Workshops led by faculty	1.93	2.32	1.94	2.00	1.89
Web-based resources and discussion groups	1.88	2.05	2.00	1.95	1.85
Activities for mid-career teachers	1.87	2.26	1.73	2.00	1.87
Small grants for individual or groups development	1.82	2.16	2.16	2.09	1.72
Interdisciplinary groups	1.78	2.22	1.88	2.05	1.72
		2.21	1.84	1.81	

Short courses	1.71				1.66
Individual consultation	1.71	1.95	1.82	2.00	1.66

Finally, in response to an item asking faculty if they would prefer to have activities concentrate at the department, college, campus or system level, faculty members on all campuses indicated that they would be most likely to participate at the department level, and their next most preferred level of participation would be at the college level. (See Table 4.)

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Table 4: Four-Campus Comparison of Percentage of Faculty Respondents Indicating High Likelihood of Participation in Teaching And Learning Development Activities at Different Institutional Levels

	Percentage of Respondents Indicating Likely Participation				
Level of Activity	Four — Campus	Crookston	Duluth	Morris	Twin Cities
Departmental	55	68	72	55	53
College	37	53 ^a	53	20	31
Campus-wide	25	47	40	22	20
System-wide	7	0	9	5	7

SUMMARY

The results of the faculty development survey indicate that, despite substantial differences among the four campuses in such characteristics as history, size, geographic location, and academic specialization, faculty development needs are remarkably similar. The most problematic teaching and learning issues for all campuses include:

- Students are hampered in their learning by time constraints.
- Students are hampered in their learning by a lack of adequate preparation in math, reading, writing, and study skills.
- Students do not complete the reading and note-taking needed to learn successfully.
- Students appear to lack sufficient motivation to learn successfully.

In addition, the areas perceived by faculty respondents on all campuses as potentially the most helpful to learn more about are:

- Process of designing and delivering instruction including web-based course instruction, enhanced lectures, and multi-media teaching tools.
- Expanding knowledge of the learning process and how to design instruction including active learning styles and diverse learning styles.

The findings also show that faculty indicate a strong preference for workshops led by teaching and learning specialists and by faculty, web-based resources and discussion groups, activities for mid-career teachers, and small grants for individual and group development. The needs assessment results also indicate that, on all four campuses, faculty prefer to have faculty development activities be department or college-based, rather than campus-wide or system-wide.

The results of this faculty needs assessment reinforce and clarify the findings of earlier assessments. The common theme is that similar significant teaching and learning problems exist on all four campuses. These learning problems could be addressed by combining the best of what is known about improving teaching with emerging findings on how technology can further enhance learning. The following section outlines what is already known about this complex problem that can inform the design for a successful faculty development initiative.

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THE CURRENT LITERATURE

Embedded in this general proposal are several issues that are central to teaching and learning and to faculty development programs in general. Among these issues are: 1) how to address the common learning problems of increasingly diverse students; 2) the feasibility of integrating web-based with other innovative strategies of teaching and learning; 3) the benefits of technology-enhanced learning; 4) common barriers to technology-enhanced learning; and 5) effective efforts to surmount these barriers. Research findings today provide uneven guidance for addressing these questions, but emerging conceptual models and accounts of innovative faculty-development programs support integrative, analytic, and applied efforts such as the ones we are proposing.

Of particular value are constructivist formulations, in which learning--whether by faculty member or student -- is viewed as requiring activities that are intended to help learners construct their own knowledge, and teaching is viewed as "supporting that construction, rather than communicating knowledge" (Duffy & Cunningham, 1996, p. 171; see also

Jonassen, Carr, & Yueh, 1998, Tennyson, 1994, and Verneil & Berge, 2000).

Three corollaries of this view converge with the rationale for this proposal (Duffy & Cunningham, 1996). First, constructivist processes result in multiple perspectives on the same or similar problems. In the course of constructing knowledge for themselves, individuals may generate a variety of insights and meanings that

may or may not be held in common with other learners. Second, knowledge is context-dependent, because learners find meaning in new information as it applies to what they already know and understand. Consequently, learning occurs most readily in contexts to which new information is relevant (Gillani, 2000; Ross & Schulz, 1999). Third, knowing how we know is as important as what we know. Insights about the nature of knowledge and intellectual endeavor are as significant in making decisions about teaching and learning as is the mastery of a body of propositions and facts. Barr and Tagg's (1995) influential article extended the principles of constructivism to the practice of teaching and learning, arguing that each faculty member's role is to "find ways to develop every student's vast talents and clear the way for every student's success" (Barr & Tagg, 1995, p. 23). Constructivist approaches thus provide a model for faculty development activities to encourage and support integrated, analytic approaches like the proposed program, as well as an essential framework for approaches to student learning problems themselves (Duffy & Cunningham, 2000; de Verneil & Berge, 2000).

In a constructivist perspective, student learning problems, such as those identified by faculty members on the four campuses of the University of Minnesota, stem in part from students' sense that their coursework is largely removed from their central experiences, and thus, is neither easily assimilable nor engaging. Furthermore, learning activities often conflict with activities or aspirations that they regard as more salient, such as their paid work or the everyday demands of their communities. In addition, as on the campuses of most public universities, many students lack effective strategies for learning and, in some cases, have poor preparation in the skills and background knowledge needed for success in higher education (Weinstein, 1999). The literature on student learning problems shows that motivational and skill deficits make reading, study, and other coursework effortful and frustrating and that students often give these activities lower priority as a result. Constructivist-inspired interventions emphasize re-examining student-centered choices in teaching and learning that "place students' needs at the heart of the design process and . . . take their backgrounds into consideration" (Gillani, 2000).

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An integrative approach encompassing multiple approaches to teaching and learning problems provides greater potential for meeting the needs of diverse students than does reliance on a single instructional model (Jonassen et al., 1998; Cole, 2000; Tennyson, 1994). Barr and Tagg's (1995) manifesto called for a shift from exclusive reliance on lectures in college and university classrooms (the Instruction Paradigm) to varied activities that facilitate a student's learning (the Learning Paradigm). Many new approaches, including cooperative learning strategies, active learning methods, classroom controversies, and the like, have emerged to support this shift; and both anecdotal accounts and empirical research findings document their efficacy in promoting student learning (e.g., Campbell & Smith, 1997; Webb, Newman, & Cochrane, 1994). One illustration of the effectiveness of integrated approaches comes from a 500-student physics class at Michigan State University. An asynchronous learning network was used for regular discussions between students and instructors and TAs about problem-solving assignments that were to have been completed by the students prior to the discussion. The goal was to address factors that contributed to poor performance (viz., deficient preparation, misconceptions about physics, inadequate mathematical problem solving skills, the tendency to fall behind, and student perception of the quality of education). Evaluation of course data collected over several years demonstrated "significant measured enhancement of the success rate of students while maintaining high standards" (Brown, 2000, pp. 51-55).

Why should the "mix" of teaching and learning strategies include technology-enhanced learning (TEL)? The literature provides diverse rationales, most of them hinging on two widely held assumptions. One assumption is that students now face a world that is increasingly based on gaining and using information. Technology, especially computers and the internet, provide the most ready access -- and in some cases, the primary access -- to the information economy in which students must become proficient. Related to this assumption is the argument that all individuals must learn to use technology, not only for information acquisition, but for carrying out diverse operations in an increasingly technological society (Nasseh, 2000). A corollary argument is that these conditions will produce demands from students and from society for technology-relevant instruction and experience and that competition from other institutions will force all institutions to make technology more central to learning. In our view, the most compelling reason is that,

for many of the student learning problems identified by University of Minnesota faculty, technology-based solutions potentially provide efficient, individualized access to course information and instructor guidance that may be difficult to achieve via other methods. Nasseh (2000) has argued out that:

... institutions of higher education can also benefit from the power and possibilities of computer and communication technologies to develop quality competency-based learning resources and programs. A computer application of a theory, a computer case study of an event, and a simulation program of a model can help students learn the subject matter in depth and use new knowledge and skills more effectively in real situations. Fortunately, every discipline has rich samples, events, and models that can be developed into computer case studies and simulation (p. 225).

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The experiences of five institutions illustrate the successful use of TEL approaches in promoting understanding and critical analysis of subject matter. At the University of Texas-Austin, French professors teamed with a computer programmer to develop a CD-ROM and companion web site to provide an interactive "multimedia French text" with links to 150 French language site and opportunities for on-going interactions with French speakers. Evaluation results showed improved student attitudes toward learning, improved language skills, and an appreciation for French as a "legitimate tool for cross-cultural communication" (Brown, 2000, pp. 258-260). At Vanderbilt, web-based writing assignments providing for exchanges and critiques among students in basic and advanced English courses resulted in students developing an improved sense of audience, more active engagement with course materials, and a heightened sense of writing as a process. Students reported that the computer-mediated exchanges brought together course materials "with a thoroughness and complexity they had seldom experienced." (Brown, 2000, pp. 234-237). Oberlin faculty members in Cell and Molecular Biology enhanced lectures and labs with an online tutorial and a "virtual" lab guiding students through experiments that require them to apply theory to practical situations and to think about the procedure they have just performed (Brown, 2000, pp. 105-108). At the University of California-Davis, a frustrated faculty member in the Biology Department used on-line materials to address the problems of "hostile non-science majors." Web-based writing assignments and "virtual discussion sessions" drew a significant number of "unsolicited student comments" to the effect that the new teaching methods had "changed their perceptions about the relevance of biology and science to their everyday lives." (Brown, 2000, pp. 93-95). Brown (2000) records similar accounts of integrating innovative teaching methods in a chemistry lab at Dartmouth, an engineering course at John Hopkins, an introductory astronomy course at George Mason, a calculus course at East Carolina University and, a course in Native American History and Culture at LeMoyne College. At LeMoyne the interactive web site facilitated discussions between students at the college and experts on Native American culture from around the country (pp. 19-21, 34-36, 48-50, 80, 129-132).

Impressive testimonials notwithstanding, teaching and learning experts increasingly propose certain caveats regarding instructional technology. As with any pedagogy, there is the danger of method bias - a tendency to choose a teaching method because a faculty member finds the structural features associated with it personally attractive (Grasha, 1996, 93-95). Faculty may choose to use instructional technology for its novelty or simply because it is perceived as "cutting edge." The most successful instances of faculty development activities involving technology require that, before employing instructional technology, a faculty member should develop a conceptual rationale for using it. It is productive to think about how using technology will affect both the way faculties teach and how students learn (Grasha & Yangerber-Hicks, 2000, p. 10). Dan Lim (2000), faculty member and director of technology at the most technologically advanced campus of the University of Minnesota, UMC-Crookston, has put it this way:

The question is not if a university has the necessary technology but if the technology is meeting the needs of teachers and students. Technology should not dictate how teachers teach, but teachers should determine what technology is best suited for achieving specific learning outcomes . . . The ultimate goal is not to 'sell' a particular brand of technology to the faculty, but to use the most appropriate technology to 'sell' learning to the students

(Lim, 2000, p. 243).

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Moreover, research findings imply that the web-based materials and activities must be student centered and that their use makes continued face-to-face contact with students, more not less important (Aggarwal & Bento, 2000).

Despite the potential of technological approaches, most institutions are finding it difficult to enlist large numbers of faculty members in adopting technology-based solutions in their classrooms. Many factors contribute to this problem (Dusick, 1998; Rogers, 2000). One is that many faculty members lack conceptual and technical skills for creating and implementing technological applications to replace or supplement existing course materials, exacerbated by both over-commitment and inertia. This problem is most evident among mid-career and senior faculty, who lack the technological background of more junior faculty. Junior faculty, on the other hand, may feel they cannot commit their limited course-preparation time to extensive use of technology. Another factor is the perception of many teachers that applications of technology typically serve only to "replace" textbooks and lectures as ways of presenting information. Indeed, up to now, technology-enhanced learning has consisted largely of information delivery, rather than stimulating the development of concepts or critical analysis (Jonassen et al., 1998). A third factor is the general problem that university reward systems provide little incentive for innovative teaching, and many faculty accordingly choose to limit the time they devote to teaching in favor of more career-beneficial activities (Dennis, 2000; Dusick, 1998).

Few faculty-development programs can be expected to overcome inherent limitations of academic and professional reward systems, but the other common barriers to innovations in teaching and learning, such as the lack of a support system among colleagues, can be addressed by well-designed programs, such the one as we are proposing (Bland & Bergquist, 1999). In their review of research literature, which includes qualitative studies, case studies and surveys, Feldman and Paulsen (1999) found that "frequent interaction, collaboration, and community among faculty" (p. 73) significantly enhance both quality of life and productivity in institutions. They note that "[O]ne of the most important institutional characteristics that can help increase the intrinsic rewards of teaching is the availability of opportunities to talk about teaching" (p. 73). Licklider, Schnellker, and Fulton (1997) remind us that "members of the professoriate belong to one of the few professions that do not engage in continuing conversations with colleagues. This 'privatization of teaching' (Palmer, 1993) has had negative consequences for faculty, leading to isolation and dissatisfaction, and for institutions, making it difficult for academe to improve student learning" (Licklider et al., p. 123). Palmer (1993) and Shulman (1993) recommend the creation of a community of discourse about learning and teaching in order to move toward a view of learning and teaching as a community experience rather than as pedagogical solitude.

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Researchers have confirmed that faculty collaboration in teaching is associated with improvement of teaching ability, increased intellectual stimulation in teaching, and reduction in the degree of isolation associated with traditional teaching (Austin & Baldwin, 1991). Indeed, faculty development leaders at other institutions report success in engaging mid-career faculty through faculty-led and collaborative activity groups with peers (e.g., Daugherty, Grubb, Hirsch, & Gillis, 2000; Dennis, 2000). A compelling instance comes from the College of Education at Michigan State University, which received a \$1.4 million Department of Education grant, entitled "Preparing Tomorrow's Teachers to Use Technology." In this innovative program, faculty are teamed with graduate students under the structure of a graduate course "to develop technological solutions to teaching and learning situations" (<http://ott.educ.msu.edu/newott>). To apply, faculty members submit a detailed proposal to address an aspect of student learning in their classes. Weekly three-hour class sessions are required. Faculty/student teams present their projects at the close of the semester. Faculty members indicated that sustained involvement over time was the key to internalizing technology-enhanced learning strategies for ongoing use. Moreover, they reported that pairing graduate

students and faculty was highly beneficial to both. Faculty members helped graduate students develop an understanding of pedagogical principles and practice, and graduate students brought an often advanced proficiency in technology to the collaboration (Ann Austin, MSU faculty participant, personal communication).

Technological training and support, while clearly necessary if faculty members are to have access to a full range of choices in teaching and learning, has taken various forms in successful faculty development programs (e.g., Maddux, Cummings, & Torres-Rivera, 1999). Programs generally are ineffective when designed primarily for training in skills for using computers and other technology (Lim, 2000). Considerable success has been reported, however, when programs begin with a consideration of teaching and learning issues in connection with a particular course for each faculty member. Technology and other instructional techniques are then incorporated as appropriate (Cole, 2000; Grasha & Yangarber-Hicks, 2000). Additional important considerations include adequate ongoing support, without which faculty may quickly become discouraged and abandon the effort. Department support and encouragement, available technical support staff and "hands-on" training all proved to be important in faculty development efforts at the University of Texas-Austin (Decker et al., 2000. p. 74).

Previous programs that have tried to introduce multiple innovative teaching strategies have varied in the amount of "hands on" activity required of faculty. Research findings, however, show that single session workshops have little effect on staff behavior. One research team concluded, "[A] more effective structure incorporates multiple sessions over an extended period of time" (Licklider, Schnelker, & Fulton, 1997, p. 124). In one example, faculty participants in a program at the University of Maryland selected from a "menu" of services to faculty, ranging from assigning student technicians to carrying out faculty plans for using technology to providing skills training and other support to faculty who undertook the technological innovations themselves. Participants were encouraged to move through the "tiers" of this system, gradually acquiring the skills and practical experience needed to be more autonomous in executing, as well as designing, technology-based strategies in their courses. Gradual, rather than "all at once" mastery and continuous provision of training and support allowed faculty learners to construct new approaches to teaching and learning in their own work (Borkowski, Henry, Larsen, & Matelik, 1997).

Finally, programs to improve instructional effectiveness are more likely to succeed when faculty undertake research on the impact of their efforts on teaching and learning (Weimer, 1990). The requirement that participants conduct research on their revised courses thus is one further element in enhancing their teaching and learning activities.

The literature of teaching and learning undergirds the goal of the proposed program: to engage faculty, especially those at the mid-career level and beyond, in efforts to diversify and integrate their teaching strategies to create active, constructive processes of teaching and learning.

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THE PROPOSED PROGRAM MODEL

These lessons from the literature, together with the highly consistent needs assessment results across four U of M campuses led faculty working committees to conceptualize a faculty development initiative that addresses the needs of all the campuses. Using this conceptualization, each campus committee has designed an implementation plan, accommodating the general model to its own unique needs and available resources. This section of the proposal presents the proposed program model, followed by the implementation plans from each of the four campuses.

The proposed program model addresses student learning problems by providing support and guidance to faculty in selecting and integrating innovative teaching strategies, including technology-enhanced learning (TEL). The program model encourages faculty and students to view technology as a multi-faceted tool integrated with other innovative teaching strategies to 1) promote student access to information, 2) foster critical thinking about that information, and 3) help students communicate about and demonstrate what they have learned. Through the proposed activities, we seek to prepare faculty to approach teaching and learning, including web-based instruction, with plans, goals, and general strategies in mind. To do this, each campus will build on and enhance the existing development programs and teaching practices, as well as draw upon the rich array of technology-enhanced learning resources that exist on all four campuses.

The target audience for these programs is faculty who have already had a number of years of teaching experience and who want to expand their repertoire to include innovative teaching and technology strategies. Particular attention will be paid to the recruitment of mid-career faculty, who have the experience of observing student learning problems, the ability to generate solutions to them, and the stature to influence peers in applying agreed-upon solutions. We assume that the more technologically adept faculty (who in many cases will be recruited as facilitators for the programs) already apply technological solutions to teaching and learning issues in their classes, although some may wish to conceptualize their use of TEL more acutely. Faculty will apply to participate in the program by outlining the particular student learning problem they wish to address and possible solutions they may choose to employ.

The proposed model, then, begins with developing goals for addressing particular problems, from which appropriate teaching innovations and technological strategies will emerge. Participants will be alerted to student learning problems identified in recent surveys including significant time constraints, inadequate skills preparation (math, reading, writing, study skills and note-taking), failure to complete reading assignments, and a lack of motivation to learn. In keeping with the constructivist perspective, programs will encourage faculty to better understand students' perspectives related to the learning problems of concern, in order to help students relate more effectively to course topics and acquire new strategies for improved learning. To address the learning problems, program planning will incorporate methodology from the scholarship of teaching and learning into faculty work with active learning and web-based instruction. In short, instead of being driven by technology, programs will involve faculty in developing effective teaching and learning goals, strategies, and outcomes as a prerequisite for determining how best to integrate innovations, including web-based instruction, into their teaching.

Throughout, faculty will be provided with a variety of development and support services and resources to give them the necessary knowledge base along with assistance in applying what they have learned to their identified teaching and learning problems. For example, faculty will learn to view technology as a multi-faceted tool that can be combined with other innovative teaching strategies to allow students to access information, foster critical thinking about that information, and help students communicate and demonstrate what they have learned. Faculty will be encouraged to combine TEL with a variety of sources of expertise, including active learning, enhanced lectures, and attention to diverse learning styles, in fashioning creative solutions to identified problems. Faculty will be encouraged to partner with students in exploring TEL and innovative teaching and learning methods through such incentives as course credit.

To help prepare faculty in diverse disciplines, planning and delivery of the proposed development program will involve collaboration between the teaching and learning centers, the technology-enhanced learning centers, and selected units or groups of faculty on each campus. Program staff will work with participants to craft training and development activities, with follow-up coaching as needed, to reflect the diverse needs of different faculty groups. Some needs may best be met by centralized training efforts while others will be most effective if college faculty lead and participate together in the sessions, with support from teaching and learning experts.

The most dramatically successful University faculty development program to date has been the Bush Faculty Development Program for Excellence in Teaching and Diversity (now the Bush Early Career Faculty Program on the UMTC campus), in which faculty resource teachers mentor pre-tenured faculty in a nine-month collaborative experience. Reports of similar faculty development efforts in other comparable

institutions suggest that faculty do not make substantial changes in their teaching styles and practices quickly or on the basis of a few days of training. Many faculty have already attended workshops or short courses on using technology to improve teaching and learning, but most report that they were not able to follow through and apply what they heard in the training sessions. The program proposes to build community among a relatively small number of faculty and by providing them with a year-long experience of an individualized combination of training, resources, and support to enable them to follow through and produce significant and lasting change in their teaching.

The resulting faculty projects may range from web sites that offer assignment feedback and alternative modes of communication between students and faculty to more sophisticated interactive sites that develop student skills in writing, critical thinking and problem solving. Each project will include an assessment plan, developed in collaboration with the outside evaluation consultant for the project. Participants will be involved in the final planning and implementation of long-range impact and outcomes evaluation.

With the support of program staff, participants will promote the program to their peers, disseminate their new knowledge within their respective colleges or units, and share results across campuses. These dissemination efforts will focus on a four-campus web site, where participants will showcase project outcomes, and on faculty presentations and exhibits on innovative solutions to student learning problems at the annual Technology Days event and the annual Academy of Distinguished Teachers conference.

Over the past decade, the University has substantially increased our commitment to develop faculty skills in teaching and learning in terms of dollars and leadership within and across colleges and campuses. The University intends to sustain this commitment and, where appropriate, contribute additional resources to it. We are confident that the proposed program will benefit significantly the quality of undergraduate education on our four campuses and expect to sustain the intended impact of this proposed program well beyond the timeline of the grant.

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THREE-YEAR TIMELINE FOR ALL CAMPUSES

March 2001-August 2001

- Preparation for start-up and recruitment of initial group of faculty participants.
- Additional needs assessment of students and faculty as needed.
- Evaluation plan developed for each campus and the overall project.

August 2001-May 2002

- Faculty participants assess, plan, acquire needed skills, and develop projects for selected courses. Evaluation plan developed for each project.
- Second semester implementation, adjustment and evaluation of projects.
- Spring program to showcase individual projects.
- Evaluation report completed on individual projects and on the first year of the project.
- Recruitment of faculty participants for the following year.

August 2002-May 2003

- Second group of faculty participants assess, plan, acquire needed skills, and develop projects for selected courses. Evaluation plan developed for each project.
- Second semester implementation, adjustment and evaluation of projects.

- Spring program to showcase individual projects.
- Evaluation report completed on individual projects, on the second year of the project and on the project to date.
- Recruitment of faculty participants for the following year.

August 2003-May 2004 (Funding to end in March 2004)

- Third group of faculty participants assess, plan, acquire needed skills, and develop projects for selected courses. Evaluation plan developed for each project.
- Second semester implementation, adjustment and evaluation of projects.
- Spring program to showcase individual projects.
- Evaluation report completed on individual projects, on the third year of the project, and on the total project.

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THE UM-TWIN CITIES COMPONENT

Project Goals

The UMTC proposal aims to improve teaching and learning on the UMTC campus by assisting faculty in addressing identified student learning problems through developing and implementing a combination of technology-based solutions and other effective teaching practices. The program addresses the diverse needs of faculty by combining the resources of the participant colleges, the Center for Teaching and Learning Services (CTLS) in the Office of Human Resources, and the Digital Media Center (DMC) in the Office of Information Technology. CTLS and DMC have shared a successful partnership for the last several years in addressing the technology-enhanced learning needs of faculty and instructional staff and their ongoing shared services model will continue in this program as well. The program will provide 24-30 participants per year (8-10 from three different colleges) with an in-depth, practical, and collaborative teaching and learning experience. During the initial year, the program will work with faculty from three colleges: College of Liberal Arts, Carlson School of Management, and College of Agricultural, Food, and Environmental Sciences. In years two and three, the number of participant colleges will be at least three, but may be more, depending on available resources from the grant and participant colleges.

Program

The program consists of a multi-phase process with a focus on classroom research and assessment, in which initial workshops and training during the first semester are followed by continuing participant contact and support during a second implementation semester. The program will require a nine-month commitment consisting of approximately 40 hours of work and a limited amount of time during the following year for course impact assessment. Participants will be guided in developing and implementing an instructional plan, using innovative teaching strategies including a web-based learning project. They also will design and participate in an ongoing assessment of the project's impact on their students and their own teaching methods, goals, and philosophies.

Participants will work primarily in small groups within their own colleges. The content of the small group sessions will be based on themes selected by the group and tailored to their project needs. Each participant will designate one of his or her courses for implementing the selected project; participants may also develop these projects jointly in pairs or subgroups. Participants will work collaboratively to assess, plan, and develop innovations in instruction for their selected courses. They will fashion creative solutions to identified student learning problems in those courses through web-based instruction coupled with active

learning, enhanced lectures, and attention to diverse learning styles. Each group will have a pair of facilitators to assist them. These facilitators will have an appropriate combination of teaching and learning and technology-enhanced learning skills, and practical experience. One of these facilitators will be a faculty member selected from its ranks by the participant college and the other a CTLS/DMC teaching and learning/technology specialist. Added to each college group will be up to three graduate students from the college with .25 FTE teaching assistantships (all funded by the Graduate School), who will participate as full members of the group and provide a link to teaching assistants in the college.

Throughout the program, facilitators selected from the participating colleges will emphasize ways of practicing the scholarship of teaching and learning, defined for the purpose of this project as:

1. Initial and ongoing needs assessment.
2. Preparation in relevant literature.
3. An inquiry-based approach to the use of web-based instruction and other innovative teaching strategies in resolving identified student learning problems.
4. Scholarly communication with peers about the results of their endeavors.
5. Presentation and/or publication of those results.

Each year in the spring, after the colleges and individual participants have been selected, program staff will work with the selected colleges to conduct focus groups with participant and interested non-participant faculty in order to explore the issues raised in the applications and previous faculty and student surveys.

In guiding their group's initial discussions, facilitators will encourage faculty to reflect on their own teaching goals and philosophies and consider their willingness to take risks, experiment, and collaborate with peers. Consistent with our constructivist perspective, the facilitators will urge a student-centered approach, in which student learning problems and student responses to course re-design will be central. Faculty will be encouraged to craft solutions to specific and immediate problems by taking a long-view of student learning and development. When participants have clear rationales for their chosen solutions, customized workshops from the Digital Media Center and other units of the Office of Information Technology will provide skill development in web-based instruction and CTLS/DMC consultants will provide assistance with other areas of teaching and learning.

During the second semester the faculty and staff facilitators will work with individuals and groups in implementing their respective projects and lead discussions on evaluating their experiences and making modifications during the semester. Participants will collaborate with the project evaluator to design appropriate evaluation activities for their projects. At the close of the semester, participants will be asked to reflect upon changes they have made in attitudes and behaviors related to teaching and learning.

Facilitators also will guide the participants in considering how to disseminate what they have learned to their colleagues within their colleges and individual departments. During the following year, a dissemination event will be held in each participant college, during which facilitators will assist past participants in conducting short-term presentations or workshops to share their solutions to student learning problems with peers. Participants also will be asked to post their results on the project web site, to present their work in the UMTC TEL Seminar Series, and to interact with peers from across the four campuses in the annual Technology Days event and the annual conference sponsored by the Academy of Distinguished Teachers. The presence of current and past grant participants at these events will also serve as a recruiting event for future participants.

Outcomes

Anticipated outcomes of this project include:

- One hundred faculty from seven or more colleges will be involved in the project, each faculty member serving as a change agent to extend the impact of the grant by influencing others in his or her college to adopt similar solutions to student learning problems.
- Change in faculty self-assessment of attitudes toward risk taking, experimentation and collaboration in teaching as demonstrated by their beginning and ending reflections on teaching.
- Demonstrable long-term change in the teaching and learning strategies in use by participant faculty in the courses they teach.
- Increased reflection on and critical use of web-based instruction by participant faculty.
- Measurable improvement in the classrooms of participant faculty on student learning problems identified in recent surveys, including time constraints, inadequate preparation in math, reading, writing, study skills and note taking, failure to complete reading assignments, and lack of motivation to learn.
- An increase in the sharing of information on teaching within the participating colleges, as evidenced by the existence of new faculty-created web sites and faculty-led workshops, and signs of increased interaction between participants and their peers aimed at solving teaching and learning problems.

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THE UM-DULUTH COMPONENT

Project Goals

UMD surveys conducted in Fall 1997 and in Winter 1999 revealed that UMD faculty wish to expand their knowledge and use of technology-enhanced learning. The UMD proposal is based on the premise that technically sophisticated and adept faculty can incorporate technology-enhanced learning into their courses fairly easily, while other faculty need specific assistance to do so.

The UMD proposal is directed specifically toward "late bloomers," faculty who have not kept up with the latest educational technology, especially web-based instruction. To become involved, these late blooming faculty require a great deal of assistance. First, they need to know how to use technology-enhanced learning to address teaching and learning problems, and then they need the technical assistance of experts who will help them develop and incorporate new technology into their courses. The UMD proposal brings together topics of expertise on teaching and learning that faculty have identified as most helpful to learn more about: student learning styles, active learning, web-based course instruction, and multi-media teaching tools.

Developers of this proposal link needs assessment findings to the proposed activities through the following assumptions:

1. Instruction using TEL helps student time constraints by allowing students to complete assignments on the web at times convenient for them. Web-based exercises and activities can replace some less effective classroom and on-campus practices.
2. Interactive web-based exercises and activities can be designed to assist students in their math and reading preparation, reading and note-taking, and study skills. For example, students can be required to respond to assigned readings by answering questions posed on their course web site before the class meeting.
3. The appeal of well-designed interactive web-based instruction to a media-oriented generation can improve student motivation and improve performance on assignments and tests.

Program

The program will be administered by the Office of the Vice Chancellor for Academic Administration, which will select a team of faculty and staff members from Information Technology Systems and Services and from the Instructional Development Service, who will be freed from some teaching responsibilities in order to mentor their colleagues. This team of faculty and staff members with extensive experience in teaching and learning and TEL, aided by qualified students, will:

1. Inform the campus community about TEL and especially interactive web-based instruction.
2. Assist targeted faculty in analyzing instructional problems and planning how TEL can address these problems.
3. Help faculty maintain, update, and evaluate TEL in their courses.
4. Serve as troubleshooters for faculty who have questions about and problems with TEL.

The UMD team will urge faculty to consider student learning problems identified by the needs assessment as well as to incorporate other innovative teaching and learning strategies into their TEL projects. The team will make presentations to departments and programs about how TEL might benefit their pedagogical mission--when and how such technology should best be incorporated in instruction. They will publicize and demonstrate the kinds of instruction that can be accomplished through interactive web sites by offering workshops in cooperation with other teaching and learning specialists on campus. An additional strategy for communicating with faculty will be web-based resources and discussion groups.

A UMD oversight committee for the grant will issue a request for proposals from faculty interested in using TEL (either individual faculty or groups with related interests, e.g. faculty in a particular department or teachers from several disciplines with common interests, such as Environmental Studies). The oversight committee will award the best of the proposals with small grants for individual or group development.

In their proposals, faculty will indicate how they envision incorporating TEL into their teaching, what precisely they wish to accomplish, and how they expect these changes will improve their teaching and student learning. The faculty advisory committee will decide which proposals should be funded, the level of assistance needed by the interested faculty, and the amount of money to be awarded. Faculty submitting proposals selected for funding will work with the team of faculty/staff mentors and student assistants in designing and creating technology-enhanced learning, and in sustaining their innovations.

Once established with the help of the grant, this program can be maintained as an adjunct to UMD's successful Tech Camp program. The oversight committee will assist with evaluation of the faculty projects, and determining if the projects meet the goals set forth in the proposals.

Outcomes

If successful, the program will achieve outcomes such as the following:

- Sixty faculty from an array of colleges will be involved in the project, each faculty member serving as a change agent who will influence others to adopt similar solutions to student learning problems.
- Faculty will be better informed about the strengths of TEL, especially interactive web-based learning and ways they could use it in their courses with the help of faculty/staff mentors and student assistants.
- Faculty who self-identify as technological beginners will use TEL for the first time.
- Faculty will receive adequate instruction and support to use and maintain TEL in their courses.

- The web sites and other TEL materials will be well designed, based on industry criteria, and effective in meeting the goals for which they are intended.
- Students will use the TEL course components and demonstrate more effective learning through their use.

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THE UM-MORRIS COMPONENT

Project Goals

UMM proposes an initiative that will promote the effective use of instructional technology by both faculty and students. The project goals are as follows:

- To increase faculty knowledge and understanding of the mutual dependence between teaching and learning styles and to show faculty how different types of instructional technology influence teaching and learning.
- To teach interested faculty, especially mid-career faculty, how to master new technologies and to incorporate technology as an integral part of some of their course offerings.
- To assist faculty in developing effective techniques for teaching students how to be critical and discriminating users of web resources.
- To equip faculty to navigate the internet, to be able to discover appropriate sites, and to evaluate student use of the internet as a resource.

As student facility with technology grows rapidly and as teachers disseminate their scholarship more and more widely on the internet, faculty members increasingly are looking toward incorporating instructional technology into their teaching strategies. Fifty-one percent of UMM faculty strongly supported educating faculty in the use of technology as a possible faculty development initiative in an October 1999 survey, and 73% of faculty who responded to a faculty development survey in February 1999 rated education in web-based course instruction as either potentially very helpful or somewhat helpful.

Program

Members of the Faculty Development Committee, with the leadership of one of the Co-Coordinator of the Faculty Center for Learning and Teaching, will oversee the program and encourage faculty involvement and select trainees and mentor/mentee pairs from the applicant pools.

The proposed program has five components:

1. Workshop: Initially UMM will present an Instructional Technology workshop with three purposes:
 - To educate faculty about teaching and learning styles and about how different types of instructional technology influence both the way faculty teach and the way students learn.
 - To show faculty how to best teach students how to be critical and discriminating users of web resources.
 - To teach faculty members how to locate quality sites on the internet and how to evaluate student use of the internet as a resource.
2. Technology Training: As a follow up to this workshop, a small group of faculty (approximately five) will volunteer to train for beginning competency in using

instructional technology tools, such as web page design, class discussion boards, and other multi-media tools. During the first year an outside consultant will serve as a trainer for these faculty members. The faculty members will incorporate what they are learning into the redesign of their courses. In addition, five student assistants, who are familiar with web-page creation, will be available to provide one-on-one technical assistance to faculty. In the second year, each of the faculty members who have received training will be responsible for serving as a trainer and resource person for approximately five additional faculty members. The outside consultant and five student assistants will also provide some additional guidance and technical assistance. In the third year of the grant, these 25 newly trained faculty members, with the help of the five student assistants, will pass on what they have learned to two faculty members each. In each year, trainers and trainees will receive summer stipends to prepare course reflections and evaluations and to summarize the impact of course design.

3. Mentor Program: In addition, a mentoring program will be established, in which junior faculty, who are generally better versed in technology than more senior faculty, will act as technology mentors to other less-experienced faculty. Each member of the mentor pair will receive an allowance for software and books to be used in improving their instructional technology skills together.

4. Mid-Career Seminar: Another program to be implemented in order to aid mid-career faculty with instructional technology is a Mid-Career Seminar. A group of approximately ten faculty will meet once every other week for two hours during the fall and spring semesters. A faculty development staff member and a faculty member or computer services staff member will lead the seminar. Seminar participants will work with one another on strategies, methods, and techniques for incorporating different kinds of instructional technology into one of their courses. At the end of the year, seminar members will have an opportunity to submit a proposal for one of two to three competitive mini-grants to fund a project involving instructional technology for one of their courses.

5. Student Instructional Technology Coordinator: An undergraduate student intern will be hired to help coordinate the UMM Instructional Technology Project during each year of the program. The intern will assist with planning for the faculty workshop and help organize the Mid-Career Seminar. It is hoped that this administrative experience will be helpful to students later in their careers.

Outcomes

Expected outcomes of this project are:

At least 80 of the 126 faculty at UMM will be involved in the project.

Faculty members will increase their knowledge of specific teaching and learning styles and how different types of instructional technology influence teaching and learning.

Faculty will be better able to locate quality sites on the internet and to evaluate student use of the internet as a resource.

Faculty will improve students' ability to be critical and evaluative users of the internet.

The degree to which instructional technology is incorporated successfully into faculty courses will increase and will have a positive effect on student learning outcomes.

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THE UM-CROOKSTON COMPONENT

Project Goals

The UMC proposal addresses the increasingly problematic gap between the potential of technology and its most effective applications in teaching and learning. Since 1993 when laptop computers were first issued to all UMC faculty and students, computer and communication technologies have become a way of life on the UMC campus. Students eagerly embraced the use of laptop computers. Faculty, however, have become segmented into different clusters based on their use and/or ability to use technology as a teaching tool. At the cornerstone of reflective practice and the scholarship of teaching and learning, is the idea that educators continually examine what they do and the contexts in which they do it. UMC faculty members have acknowledged their need to analyze and evaluate if, and how, technology makes a difference in student learning. This program will support UMC faculty as they intellectually engage in analyzing what effect technology and other teaching methodologies and tools have on student learning in the context of their respective courses.

The UMC program will begin with a dual focus on what faculty hope to accomplish based on their instructional goals and how technology can be most usefully integrated with other strategies to improve student learning. Faculty will participate in assessing whether and how web-based instruction and multi-media teaching tools can be used effectively. Reflecting the constructivist perspective of the program, faculty will learn to conceptualize technology not just as a means of delivering information but as a knowledge construction tool that students learn with rather than from.

Program

The proposed UMC program will have three major components:

1. Faculty Cohort Teams

Faculty cohort teams with five to seven members will be the key mechanism for implementation of this project. The creation of faculty cohort teams is an attempt to design a professional development process, which will empower and support faculty as they attempt to improve their ability to help students learn. Faculty cohort teams are vehicles to motivate, share labor, and build in a supportive group process. During the first year of the program, at least two faculty cohort teams will be initiated, and during the second year, two more teams will be added.

Each faculty cohort team will select at least one of the problematic student learning issue(s) identified in this proposal (study skills, reading/note-taking, motivation, preparation, performance) to discuss and design work for the improvement of student learning and faculty teaching and learning. The teams will meet to discuss the selected teaching and learning problem a minimum of once a month, with frequency of meetings determined by team members.

Faculty cohort team members will: a) choose a methodology to structure their work on assessing the teaching and learning environment in which these "problems" exist; b) design and/or implement a classroom assessment activity; c) determine learning outcomes and instructional purposes for their content area; d) deliberate regarding potential approaches to affect desired change in the teaching and learning environment; e) discuss and/or seek technical support for the selection of the technology most suitable to

facilitate meeting the learning outcome for a specific course; f) and work collaboratively to design and implement at least one teaching activity to either improve student study skills, student reading or note-taking, student motivation, student preparation, and/or student performance.

Team members will be responsible for the following: a) reading preparation prior to team meeting; b) participation in discussion, reflection, and feedback at team meetings; c) designing and implementing at least one new teaching activity; and d) attending at least one teaching and learning workshop. A summary of thoughts and ideas generated during each faculty cohort team meeting will be posted on the Web after each faculty cohort team meeting so that other members of the University community may contribute and be involved in the exchange of ideas.

Co-facilitators for each Faculty Cohort Team will assume a role of leading and consensus building, not of directing or controlling group activity. If at all possible, a faculty member of the Professional Development Committee will serve as one of the co-facilitator team members. Student leaders will be invited to assist in the creation of student learning focus groups. A member of the student learning focus group will be a liaison to the faculty cohort team working on the same/similar problem (e.g. student learning group: study skills; faculty cohort team: study skills)

Professional development funds will be awarded faculty cohort team members to recognize their engagement in reflective practice and participation in the use of innovative teaching strategies to improve student learning. Funds will be used for three categories of expenditures: a) funds for faculty travel to seminars, workshops, or conferences that the team deems appropriate for their development as teaching scholars; b) funds for the development of educational resources to enhance the teaching and learning environment and/or student learning; c) summer stipends for instructional development work (for nine-month appointments). Professional development committee members with one elected representative per faculty cohort team will be the decision-making body to determine criteria for authorizing any funding requests or awards.

2. Teaching and Learning Workshops and Retreats

Advancements in computer and communication technologies, increased awareness of teaching and learning styles, teacher and learner expectations, and changes in student body (e.g. internet generation) are significant reasons for retraining of interested faculty, especially mid-career faculty. Multiple sessions of workshops over an extended period of time will support and further the work of faculty, especially faculty cohort team members. A faculty retreat focused on teaching and learning will be the vehicle for bringing faculty cohort team members and other interested faculty together to examine the scholarship of teaching.

3. Teaching and Learning Mini-Grants

To provide support to faculty who wish to devote more time to applying the outcomes of the team meetings to their courses, faculty will be given an opportunity to apply for teaching and learning mini-grants. These grants will assist faculty in designing classroom assessment activities and/or using technology as a tool for the enhancement of the teaching and learning environment. Faculty can achieve eligibility for mini-grant funding through any of the following roles: a) individual cohort member; b) cohort partners; c) cohort team; or d) cohort member and campus non-cohort member. Faculty Professional Development Committee members with one additional elected representative per faculty cohort team will be the decision-making body to determine criteria for authorizing any funding requests or awards.

Outcomes

Anticipated outcomes of the UMC initiative include:

At least 30 of the 58 faculty at UMC will be involved in the project.

Faculty cohort members will practice the scholarship of teaching and learning as they participate in self-assessment activities, review literature, engage in reflective dialogue, collaborate with campus colleagues, make changes in the courses they teach, observe and record changes in student learning, and communicate with peers regarding their experiences.

Student study skills, student failure to do reading and note-taking, lack of motivation, and performance on assignments and tests will become less problematic, as perceived by faculty cohort members based on data collected for program evaluation.

Success of this faculty development process will be reflected by the level of faculty engagement with increasing numbers of faculty choosing to participate on faculty cohort teams, attend teaching and learning workshops, and make successful mini-grant applications.

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PROPOSAL SUMMARY

While the implementation plans set out above vary slightly in reflecting the differences across the four University campuses in faculty roles and instructional programs, they remain united by the common threads listed at the beginning of the proposal. Together the campus programs have adopted a multi-phase developmental process that is peer-based, student centered, and entails a learner-to-mentor progression.

These common threads reflect the documented needs of University faculty members and draw upon the experiences of other institutions, as well as the growing body of literature attesting to the success of development programs that emphasize multiple strategies to meet instructional goals and enhance active engagement in learning. Faculty members responding to the university-wide survey: 1) recognized the need to address a number of identifiable student learning problems; 2) expressed a desire to learn more about innovative ways of designing and delivering instruction, including active learning techniques and web-based course instruction; 3) preferred workshops jointly-led by teaching specialists and experienced colleagues held at the department or college level; and 4) suggested small grants for individual and group development.

On all four campuses, faculty participants will organize themselves into various collaborative groupings to analyze instructional goals, to address student learning difficulties, and to create alternative teaching strategies. These programs will be faculty-led, draw upon existing campus-based resources, be driven by the desire to improve teaching, require sustained involvement by participants, be cognizant of diverse student learning needs, foster active participation in the evaluation of the impact on student learning, and will facilitate dissemination of successful models of integrated instructional designs.

The expressed desire of faculty at the University of Minnesota for increased opportunities to "talk about teaching" echoes the experiences of other institutions, large and small, across the country. The overall goal of these proposed programs is to engage faculty throughout the University in the creation of a collective discourse that will move us toward a view of teaching and learning as a community experience, rather than pedagogical solitude.

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EXISTING PROGRAMS AND UNIVERSITY SUPPORT

Under the leadership of President Mark Yudof and Executive Vice President and Provost Robert Bruininks, recent long-range plans have pledged the University to a continuing effort to "improve the quality of the

undergraduate experience." A significant step in fulfilling this pledge is the establishment of the Academy of Distinguished Teachers, a group of over 120 faculty who have won awards for their teaching and who commit themselves to improving the climate for teaching and learning on the four campuses of the University. University commitment to teaching and learning is also reflected in the current budget that proposes hiring additional faculty and raising faculty salaries to help boost undergraduate education. As part of this effort, the Provost's office oversaw the development of a "Strategic Plan" for the use of innovative technology in teaching, which set out a blueprint for integrating resources and establishing the University as a statewide partner and national leader in the design, delivery, and research of innovative forms of learning. In the spring of 2000, both the President and the Provost helped to kick off "Technology Days," a two-day event sponsored by the Office of Information Technology, which provided University leaders with an opportunity to communicate their vision of an "e-revolution" to faculty, staff and students.

Support for this movement is evidenced throughout the system. In a 1999 survey, deans and administrators from all four campuses expressed their support for the University's investment in technology and identified ways to further the goal of implementing technology in teaching throughout the system. Faculty who have already integrated technology into their teaching often report how the incorporation of web sites or CD-ROMs into the learning process has helped them rethink the teaching of concepts, ideas, and skills, reinvigorated their interest in teaching, and allowed them to create new learning environments for their students. Students, in turn, report that the use of technology has increased their access to information, facilitated interaction with other students, instructors, and researchers, and provided learning opportunities at expanded times.

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UM-TWIN CITIES

On the UMTC campus, the Center for Teaching and Learning Services (CTLS), a unit of the Office of Human Resources, offers a wide range of instructional development activities for faculty, instructional staff, and teaching assistants and the Digital Media Center (DMC), a unit of the Office of Informational Technology (OIT), provides training for faculty use and in technology-enhanced learning. CTLS programs include the annual fall Teaching Enrichment Series, which offers orientation programs and workshops in teaching and learning for new faculty, instructional staff and teaching assistants, and the Bush Faculty Development Program for Excellence and Diversity in Teaching, a mentoring program pairing experienced faculty with more recently hired faculty members.

In addition, the Mid-Career Teaching Program, inaugurated in Spring 1999, has already proven to be a highly successful effort to reinvigorate recently tenured faculty. CTLS staff members have also lent their expertise and assistance to the Faculty Onestop teaching web site, which provides resources to faculty about teaching and learning, the Portfolio Project, which helps students develop learning portfolios, and the CTLS web site, which offers a rich variety of teaching and learning resources.

The Digital Media Center is the primary unit for training faculty in the use of technology to enhance learning. DMC provides laboratory space for workshops and classes, loans out its state-of-the-art multimedia hardware and software, houses an extensive library and free WebCT accounts for all faculty. Collaborating with CTLS, as well as the University Libraries and other units within OIT, DMC staff members consult with faculty on how to design, implement, and evaluate multimedia projects, and conduct multimedia presentations. The DMC also publishes electronic and print materials to help faculty develop multimedia teaching and learning tools.

The DMC and OIT also facilitate a TEL Small Grants Program, sponsored by the Executive Vice President and Provost, which is currently seeking grant proposals from faculty for the development of individual projects. The DMC and the Provost's Office also sponsor a Faculty Fellowship Program, which offers

participating faculty release time to initiate projects in a supportive environment and to prepare for leading roles in providing input into their college or department strategic TEL plans.

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UM-DULUTH

On the UMD campus, the Instructional Development Service (IDS) in the College of Education and Human Service Professions works to improve teaching by conducting workshops, publishing a newsletter, providing a resource library, and bringing faculty together for dialogue and support. In addition, IDS offers individual and group consultation, plays an important role in the intensive teaching orientation program for graduate teaching assistants and participates in New Faculty Orientation and other faculty development efforts, including multiple development workshops throughout the school year.

UMD has also made a firm institutional commitment to technology-enhanced learning and has provided money for technology consultants, the creation of a technology learning center, and faculty travel to conferences. IDS and the Learning Technology Center, a unit of Information Technology Systems and Services, conducted well-attended workshops for faculty and staff on programs such as PaintshopPro, Excel, PowerPoint, Windows and WordPerfect. Beginning in 1998, IDS held the first in a yearly series of "TechFest" mini-conferences and "TechCamps." This year's "Camp" (the fifth in the series) will be held January 3-11, 2001, and include workshops and hands-on activities for 20 participants to help lay the groundwork for designing and teaching courses using a variety of technological tools.

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UM-MORRIS

On the UMM campus the Faculty Development Committee (FDC) oversees development efforts and the Faculty Center for Learning and Teaching (FCLT) carries them out. The FCLT provides a lending library, video equipment, computer workstations, and distributes the faculty newsletter, *Focus on Faculty*. FCLT programs include the Faculty Enrichment Project (FEP), a mentoring program pairing new tenure-track faculty with tenured faculty who guide them through all aspects of the tenure process and adjustment to university life, the Fall Faculty Workshop that brings faculty together in a retreat setting to discuss a variety of issues in higher education, and a Mid-Career Teaching Program for faculty, modeled after the successful program on the UMTC campus. The FCLT also facilitates monthly research presentations by faculty members to faculty, staff, and students, provides a small amount of travel money to encourage faculty participation at conferences, and maintains a Syllabus Bank to help faculty prepare new courses. Recently UMM was awarded a grant from Learn and Serve America to develop a service-learning program, which will include initiatives to educate faculty about service learning and assist them in course development.

UMM Computing Services provides networking and technology support for the instructional technology effort, which includes individual consulting and training, hands-on workshops open to all faculty, and small "current awareness" sessions tailored to specific academic disciplines. Last summer Computing Services offered an Instructional Technology Institute, the first-ever intensive, three-day, hands-on technology training program for UMM and area faculty members. Media Services, like Computing Services, offers hands-on workshops for faculty and provides staff support for digital media, streaming video, and digital photography. UMM also maintains a regional presence as a member of Minnesota Instructional Network Supporting Teaching and Research Using Current Technologies (MN.INSTRUCT), a multi-institutional instructional technology support initiative in Southwestern Minnesota, which is funded through August 2000 by a grant from the Minnesota State Colleges and Universities.

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UM-CROOKSTON

At UMC, the utilization of technology to improve student learning and promote more independent and responsible learning is supported most directly through the Instructional Technology Center (ITC). ITC conducts workshops for faculty, such as sessions on the use of Toolbook authoring software, maintains on-line tutorials on a variety of technology related topics, including WebCT, Toolbook, instructional design and various graphic programs, and provides funds to support travel to events such as the Electronic Academy Summer Institute, the Innovators in Education Conference, and the Fifth Annual Instructional Technology Conference. This last summer ITC conducted a workshop on the use of WebCT and an Interactive Courseware Camp at both the intermediate and novice levels. This fall there will be training sessions on WebCT and Windows 2000.

These and other ongoing activities have helped push faculty toward an integration of technology and teaching as demonstrated by the use of computerized teaching materials in the Health Management Program, web-based instructional materials in use in Composition I and Chemistry, a CD-ROM in use by one instructor in history, and instructional models in math and physics using Authorware. With the requirement that all students have a laptop computer, UMC remains committed to faculty-student partnerships in the development of technology-integrated coursework.

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WHO WILL BE INVOLVED

The proposers of this grant are four campus-based faculty committees. Professor W. Andrew Collins, a member of the Academy of Distinguished Teachers, leads the four-campus effort and chairs the UMTC faculty committee with the assistance of Dr. Jan Smith, Co-Director, UMTC Center for Teaching and Learning Services. Heading up the UMD faculty committee is Professor Steve Adams, also a member of Academy of Distinguished Teachers. At UMC, Professor Sharon Stewart, Chair of the Faculty Professional Development Committee, leads the faculty planning effort with assistance from Professor Marilyn Grave. At UMM, Dr. Anne Farrell, a Co-Coordinator of the Faculty Center for Learning and Teaching, and Professor Bert Ahern, another member of the Academy of Distinguished Teachers, chair the faculty committee planning the grant. Faculty committee members responsible for this proposal are listed in the appendices.

On each campus, key faculty will be involved in ongoing leadership for the grant. In addition, staff members from campus centers for teaching and learning and centers for technology will support faculty in their efforts to improve student learning. On the Twin Cities campus, the faculty facilitators from participating colleges will join to form an oversight committee in collaboration with the Center for Teaching and Learning Services and the Digital Media Center. On the Duluth campus, Professor Linda Deneen will lead the team of faculty and staff selected to facilitate the work of faculty participants with the guidance of the Office of the Vice Chancellor for Academic Administration. On the Morris campus, the Faculty Development Committee will play an advisory role for the grant and grant activities will be coordinated by Dr. Anne Farrell. On the Crookston campus, the newly formed Bush Teaching and Learning Advisory Committee will play an advisory role for the grant; grant activities will be coordinated by Professor Marilyn Grave. Dr. Sigrid Hutcheson, outside evaluator for the planning process, will serve as outside evaluator for the grant.

Principal investigators for the grant are Carol Carrier, Vice President for Human Resources, W. Andrew Collins, UMTC faculty member and leader of the planning effort, and Robert Jones, Interim Vice President for Student Development and Vice-Provost for Faculty and Academic Personnel. A four-campus steering committee will be responsible for system-wide coordination as well as evaluation of the grant; Professor Collins will serve as chair of the steering committee. Steering committee members include Professor Linda

Deneen (UMD), Professor Anne Farrell (UMM), Professor Marilyn Grave (UMC), and one of the UMTC faculty facilitators. Dr. Jan Smith (UMTC) will serve as grant facilitator for the University and the UMTC campus as well as liaison to the Bush Foundation on behalf of the principal investigators. Short vitas for the leadership of the grant can be found in the appendices.

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EVALUATION PLAN

OVERVIEW OF EVALUATION APPROACH

This evaluation plan describes an overall four-campus approach to the evaluation of the faculty development project. The intent is to lay out broad parameters for the project evaluation and to describe the domains on which the evaluation will focus. In addition, the plan describes some of the evaluation methods to be used. While each campus will have its own project implementation strategy, all four campuses will be applying technology enhanced learning in some form to address student learning issues, so many of the evaluation questions will be the same across campuses.

The evaluation will address the following goals:

To document and describe the project as executed at each of the four campuses including participants, program and activities, and products.

To assess the strengths and weaknesses of the program as implemented on an ongoing basis to provide data for continuing improvements.

To evaluate the impact of the project on faculty, students, courses (knowledge, attitudes, behaviors, performance, outcomes/results, products).

To examine the extent and success of dissemination to other faculty, colleges, participating campuses, and wider academic circles.

To evaluate the extent to which the project produces results that address the critical issues identified in the needs assessment.

EVALUATION DESIGN

The needs assessment findings were used as the basis of the project design and will also be used as the basis for the evaluation. The evaluation will use the Kirkpatrick (1998) model for evaluating training programs, which evaluates at four levels: evaluating reaction, evaluating learning, evaluating behavior, and evaluating results. The evaluation will examine the way the project is implemented as well as the results that the project produces.

Assessment of Project Implementation

This phase of the evaluation will concentrate primarily on describing and evaluating the activities and components that constitute the project in order to provide useful information to project managers to help them maximize the quality and value of the project activities. In addition, this portion of the evaluation will lay the ground work for the remainder of the evaluation by giving a complete picture of all the components of the project as the initial step before the evaluation begins to assess the impact of these components. In other words, first the evaluation will address how well the project components were implemented and then

it will address the impact of these components on the participants, on the students, and on the wider academic community.

Data will be gathered on an ongoing basis to document, monitor and evaluate the project including the following components:

Project activities -- How successful were the individual project components and the overall project implementation? This component of the evaluation may include assessment activities such as:

Tracking the process used in all phases of the project from initiation through implementation.

Describing the program components and how they are operated.

Analyzing how well the program components were carried out.

Assessing the quality of activities by participants.

Assessing the organization and management of the project.

Tracking the availability and usefulness of resource and support people.

Assessing the quantity of support services provided by various sources and the value perceived by faculty participants.

Reviewing the extent of collaboration with other campus technology and teaching/learning resources.

Evaluating opinions of key stakeholders about project activities and products.

Participants - Who were the participants, how did they participate, and how did the project affect them? This component of the evaluation may include assessment activities such as:

Describing the participants, number participating and number completing programs.

Tracking the extent and quality of participation.

Tracking the number of departments participating.

Asking faculty for a self-assessment of learning.

Identifying participants who discontinue the program and assessing why they did not complete the intended goals or were in some other way not successful within the project.

Products -What products did the project produce and how successful were these products? This component of the evaluation may include assessment activities such as:

Asking external experts to evaluate new teaching resources and materials produced.

Tracking the use of new resources, i.e., number of students affected, number of faculty using materials, number of hits on web sites.

Asking students to evaluate quality and impact of new resources and teaching approaches.

Strategies to be used to evaluate project activities will include:

Asking participants to complete evaluations at the conclusion of structured activities.

Periodically interviewing faculty participants to determine progress and unmet needs.

Tracking and documenting amount of faculty participation and work on project.

Gathering opinions and perceptions from trainers, mentors and other individuals participating as resource persons.

Using external experts to give objective evaluations of teaching resources developed.

Gathering numerical data to quantify participation and level of activity.

The following three sections outline critical questions the evaluation may answer in the areas of impact on faculty, impact on students, and dissemination/sustainability. These sections pose questions that will be used as the basis for developing specific instruments to evaluate particular dimensions of the project. Not every question will be answered on every campus. These questions will guide our thinking in determining the specific outcomes we will evaluate for each campus project.

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Assessment of Impact on Faculty

Faculty reactions, knowledge, behaviors, attitudes, and products will be monitored on an ongoing basis to track the impact of the project activities. The evaluation will examine the extent to which the project activities have led to meaningful changes in faculty that can be expected to produce the desired changes in student outcomes. Potential questions that may be explored with faculty include:

Did the faculty successfully link teaching and learning with technology?

Can faculty articulate a clear rationale for their technology choices?

Did faculty use the technology effectively in their instruction?

Did the faculty integrate web-based technology with other instructional approaches?

Was there an increase in the number of faculty using web-based approaches in their classes?

Did the faculty become more knowledgeable about and proficient in the use of technology-enhanced learning?

Were faculty successful in learning the new technology?

Did faculty receive sufficient training and support to master the new technology?

Are faculty more skillful in using technology in their teaching?

Was there increased interest in programs offered for faculty on using technology?

What training, support, or mentoring components appears to be most critical for helping faculty move from discussion to meaningful action?

Did the faculty modify their instructional approaches to incorporate technology-enhanced learning?

How did faculty analyze their instructional needs and diagnose the problem areas?

How did faculty approaches to teaching and learning change?

How did courses change?

In what ways did faculty use web-based technology to enhance lectures, involve students in active learning, and respond to diverse learning styles?

Did faculty feel their distinctive teaching needs were met?

How did the use of web-based technology affect how faculty used their time in the course?

Were there long term changes in the teaching and learning strategies used by faculty?

Did faculty incorporate their knowledge of web-based technology into their research activities?

Were faculty-student research collaborations a viable way for faculty to build technology capacity and students to learn research skills?

Strategies for evaluating the impact of the project on faculty will depend on the time line for project implementation. The progress of each faculty member will be tracked through regular reporting. Faculty perceptions about what they are learning and the effectiveness of the support they are receiving will be collected periodically. At the end of each project year, detailed information will be collected from faculty participants on the following:

Their assessment of the effectiveness of the training and support they have received.

Their attitudes toward technology in education.

The success of their project.

How the project affected their teaching.

How they perceive it has affected student learning.

Assessment of Impact on Students

The ultimate goal for this teaching and learning project is enhanced learning for students, particularly as evidenced by changes in the four student learning obstacles identified in the needs assessment. This portion of the evaluation starts from the assumption that students who are motivated, have the necessary reading, writing, math and study skills, do the required reading and note taking, and have sufficient time to complete class requirements will learn more than students who do not possess these characteristics. The evaluation will address the question of student outcomes from two perspectives:

First, student behaviors, knowledge and attitudes related to the needs assessment findings will be measured and tracked over the duration of the project. Data will be collected to monitor indicators closely related to achievement, so that positive changes in them can be expected to increase the probability of improved student achievement.

Second, to the extent possible, a series of class-specific or faculty-specific evaluations will be conducted using a variety of techniques to measure whether there are changes in student learning and achievement that can be attributed to the project activities in which the faculty are participating, i.e. specifically to the introduction of technology-enhanced learning.

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The evaluation of student outcomes will address the following range of questions.

Global questions

What was the response of students?

What did students learn about being critical consumers of technology?

How did student behavior change?

What indicators suggest students learned more?

What conclusions can be drawn about learning?

Did the incorporation of web-based technology into course design influence how students use their time in the course?

Did students change how they use their learning time?

Did students use their time for learning more efficiently?

Did the project give students more time flexibility in learning?

How did areas such as the following change: design of assignments, ways to receive feedback, gaining access to resource materials, communicating with faculty, forms of testing and assessment?

At what times of the day, week, or semester was use of web-based technology greatest?

Did web-based technology in a course provide options for skill enhancement in reading, writing, math and study skills?

Did student study and learning behaviors and practices change?

How did the web-based technology help students who were weak in skills for reading, math, writing, and studying?

Did web-based technology improve the quality and amount of student time spent on class preparation?

Did students learn more, master more content?

Were students better prepared for class participation?

Did students do readings, complete written assignments on time?

Did web-based technology improve student motivation?

Did the project affect student motivation?

Did student engagement in web-based instruction vary over the duration of the course?

What factors determined variation in student response and use of web-based technology?

Did students become more critical/evaluative users of web-based technology?

Did web-based technology help students improve their skills in critical thinking?

Did students become more critical and evaluative users of the Internet?

Students in classes being taught by the faculty participants will be surveyed at appropriate times to ascertain:

Student perceptions of how they are using their time differently.

How the course provided for improving skills in reading, writing, math and/or study skills.

How it affected the quality and quantity of time spent in class preparation.

How it affected their motivation.

These student perceptions of the class provide valuable insights into the extent to which learning may be improved.

The context in which this faculty development project is operating makes measuring its actual impact on student performance and achievement somewhat challenging. In order to overcome some of the obstacles, a set of mini-studies will be designed from which individual faculty and campuses can select a few which are appropriate for them. Some examples are:

Comparison of results of a standard final exam taken by students in some sections of a class taught in old way and some taught in revised courses using technology enhanced learning.

A pre- and post assessment of student current practices or behaviors in three areas: a) study skills, b) reading, and c) note-taking.

Documentation of student self-assessment and reflective learning to be developed in student focus group meetings during the year.

Student use of time will be documented in student logs to track how time usage is affected by technology enhanced learning, and how time usage changes over the duration of the course.

Changes in students' ability to be critical consumers of Internet resources to be assessed through the use of case studies.

Assessment of Dissemination/Sustainability

A final aspect of the evaluation will assess how the findings of the project are disseminated and how the results of the project will be sustained when the external funding has ended. Some of the questions that will be considered include:

What impact did the program have beyond the target faculty?

Did faculty conduct critical analyses of the use of web-based technology and disseminate their findings through writing and presentation?

Were the project results disseminated within colleges, within campuses, or system wide?

What materials were published about the project activities and achievements?

What evidence exists of impact of this project in other courses, other faculty, etc.?

Were there changes in team teaching, collaborative activity, faculty relationships and networks?

What were the benefits, strengths and weaknesses of the four-campus collaboration?

To what extent did faculty readiness to participate in the project increase after the first year of the project?

What will happen to the project results when the external funding ends?

To what extent did faculty sustain the project efforts after the completion of their formal involvement in the program?

Do the observed benefits justify the costs of initiating and sustaining this faculty development project?

Faculty participants will provide written reports and give presentations related to project activities. They will also do an assessment of the impact their activities have had on colleagues. Key administrators and non-participating faculty will also be surveyed to determine their perspectives on the wider impact of the project. To the extent possible, the actual costs involved in moving a faculty project from initiation through to full implementation will be summarized, both the one-time-only costs of initiation and the recurring costs required to sustain the project. These data will be important for planning for the sustainability or possible expansion of the project.

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PROPOSED IMPLEMENTATION PLAN

A specific evaluation implementation plan will be developed for each campus when faculty have been selected, their projects identified, training and support activities developed, and a time schedule adopted. The evaluation effort will involve a variety of data collection strategies including both quantitative and qualitative data. The plans will incorporate all dimensions outlined above, but will include special emphasis on the issues and interests important to each campus. Common data collection instruments and techniques will be employed as much as possible so that the project yields comparable data across campuses. Basic instruments will be designed for use on all campuses to evaluate generic project activities such as workshops, short courses, and individual consultations. The instruments will include questions to gather the information required to assess the quality of these activities. Campuses may add additional questions if there are any special dimensions on which they want feedback from participants. The evaluation consultant will assist each campus in further developing an evaluation implementation plan, creating standard instruments to be used by all campuses, and monitoring the progress of campus evaluation efforts. Project managers will receive regular feedback on responses to individual activities, and a comprehensive evaluation report will be prepared for each campus and for the overall project annually.

BUDGET

The University requests \$330,000 for each of three years, for a total of \$990,000. This amount is in accordance with suggestions of Bush Foundation personnel regarding the limits of available funding. Each University campus has provided a detailed budget of expenses required to implement its plan. These expenses include faculty course releases, summer salaries, or stipends, salaries and benefits for non-faculty personnel, honoraria and expenses for outside speakers, food and facilities costs for workshops and seminars, computer software and software training, a minimum of computer hardware for technical consultants, supplies and operating expenses, and funds for collecting evaluation data. In addition, each campus and the University system have identified in-kind contributions. Budgets and rationales for the four campuses and the University appear below.

The Twin Cities campus requests yearly course release funds for three college-selected faculty facilitators, along with development funds for each faculty group to invest in grant projects. The budget includes food and supplies for college groups and .3 FTE clerical support for program logistics. The Twin Cities requests 1.25 to 1.5 FTE for teaching and technology consultants to assist the faculty facilitators. These joint hires of the Center for Teaching and Learning Services and Digital Media Center will require a minimum of start-up computer hardware and software and initial training in specific software. Faculty participant groups require customized software training arranged through the Office of Information Technology. The project will also require \$8,745 per year for the collection of evaluation data. UMTC in-kind contributions include .2 FTE in salary and benefits for the grant facilitator, up to ten yearly .25 FTE teaching assistantships for graduate student participants funded by the Graduate School, and faculty hardware and software.

UM-Twin Cities				
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		Year One	Year Two	Year Three
Course releases for faculty facilitators		\$45,000	\$45,000	\$45,000
Development funds for college groups	\$5,000 per group	15,000	15,000	15,000
Food and supplies	\$1,000 per group	3,000	3,000	3,000
Clerical salary	.3 FTE	10,500	11,025	11,576
Clerical benefits	27.7-30.3%	2,909	3,341	3,508
Teaching/technology consultant salaries	1.25-1.5 FTE	60,000	63,000	69,150
Teaching/technology consultant benefits	27.5-31.1%	16,500	19,593	21,506
Hardware for consultants		6,158	0	0
Software for consultants		2,000	0	0
Initial software training and professional development for consultants		2,000	2,000	2,000
Customized software training for participants		12,000	12,000	12,000
Collection of evaluation data		8,745	8,745	8,745
Subtotal per year		\$183,812	\$182,704	\$191,485
Total for three years				\$558,000
UMTC in-kind contributions:				
.2 FTE Jan Smith salary and benefits, up to ten .25 FTE teaching assistantships funded by the Graduate School, faculty hardware and software				

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The Duluth campus of the University requests course release funds for faculty and staff to be selected for its mentoring team, along with student assistant salaries for students on the team. The budget calls for \$10,000 per year in small grants to be awarded to individual faculty pursuing special projects under the grant. The Duluth campus requests \$7,000 per year in administrative expenses and \$2,820 per year to collect evaluation data for the project. UMD in-kind contributions include \$25,000 for .5 FTE salary and fringe, as well as faculty hardware and software.

UM-Duluth				
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		Year One	Year Two	Year Three
Course releases for faculty/staff mentors		\$33,180	\$33,180	\$33,180
Student assistant salaries		7,000	7,000	7,000
Small grants to implement individual proposals		10,000	10,000	10,000
Administrative expenses		7,000	7,000	7,000
Collection of evaluation data		2,820	2,820	2,820
Subtotal per year		\$60,000	\$60,000	\$60,000
Total for three years				\$180,000
UMD in-kind contributions:				
\$25,000 for .5 FTE salary and fringe, faculty hardware and software				

The Morris campus of the University requires .1 FTE and benefits for a coordinator and an equivalent amount for clerical costs. UMM requests funding for facilities, lodging, food, and a speaker honorarium for the Instructional Technology workshop. In addition, UMM will require funding for a consultant, faculty trainer summer salaries, and student assistants for summer training following the workshop. Subsequent one-on-one faculty training calls for \$5,000 per year in mentor/mentee stipends. Additional UMM costs include funding Mid-Career Seminar course packets and food, three competitive mini-grants, a student instructional technology coordinator, and office expenses. The Morris campus requests \$1,875 per year to collect evaluation data for the project. UMM in-kind contributions include .1 FTE for coordinator salaries and benefits, \$2500 in operating expenses, and faculty hardware and software.

UM-Morris				
		Year One	Year Two	Year Three
Coordinator salary and fringe	.1 FTE	\$4,916	\$5,064	\$5,216
Clerical salary and fringe	.1 FTE	2,783	2,867	2,953
Faculty workshop speaker honorarium		1,000	0	0
Faculty workshop facilities		200	0	0
Faculty workshop lodging	25 overnight	2,500	0	0
Faculty workshop food	50 faculty	1,300	0	0

Faculty trainer summer salaries	5-25 @ \$500	0	2,500	12,500
Consultant to train 5 faculty on campus		5,000	2,500	0
Trainee summer salaries	5-25 @ \$200	1,000	5,000	10,000
Student assistant to work with trainees	5 @ \$1520	7,600	7,600	7,600
Mentor/mentee stipends	10 @ \$500	5,000	5,000	5,000
Mid-career seminar course packets	10 @ \$24	240	240	240
Food for mid-career seminar	10 weeks @ \$20	200	200	200
Competitive mini-grants	3 @ \$350	1,050	1,050	1,050
Student instructional technology coordinator		1,500	1,500	1,500
Office expenses		102	102	102
Collection of evaluation data		1,875	1,875	1,875
Subtotal per year		\$36,266	\$35,498	\$48,236
Total for three years				\$120,000
UMM in-kind contributions:				
.1 FTE Anne Farrell, .1 FTE clerical,				
\$2500 operating expenses, faculty hardware and software				

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The Crookston campus of the University requires summer salary and benefits for its coordinator and faculty summer stipends to be awarded as mini-grants. UMC requests funding for consultant honoraria and expenses, food, and facilities costs for its planned teaching and learning workshops and retreats. In addition, Crookston campus expenses for the grant include amounts for general operating supplies and computer software. The distance of UMC from other campuses makes requested funding for telephone costs and domestic travel essential. UMC requires \$1,560 per year to collect evaluation data for the project. UMC in-kind contributions include \$21,325 to \$21,650 per year in salaries, benefits, printing, telephone, and postage, faculty hardware and software.

UM-Crookston				
		Year	Year	Year Three
		One	Two	
Coordinator salary	(2-3 weeks	\$4,660	\$3263	\$3,426

	summer)			
Coordinator benefits		1,679	2,614	2,665
Faculty summer stipends (mini-grants)			8,000	8,000
Consultant honoraria		5,000	3,500	1,500
Consultant expenses		2,000	1,000	500
Food & Provisions/Facility Rental		6,000	4,000	4,000
General operating supplies		900	800	800
Computer software		1,500	1,500	1,500
Telephone/long distance/fax		200	200	200
Domestic travel		9,000	9,000	9,913
Collection of evaluation data		1,560	1,560	1,560
Subtotal per year		\$32,499	\$35,437	\$34,064
Total				\$102,000
UMC in-kind contributions:				
\$21,325-\$21,650 per year in salaries, benefits, printing, telephone, and postage, faculty hardware and software				

The campuses of the University of Minnesota have worked diligently as a system to plan together for grant activities and costs. All four campuses will share the services of the outside evaluation consultant at a cost of \$10,000 per year. In-kind contributions for the University of Minnesota system include .05 FTE for each of three principal investigators, .15 FTE for the grant facilitator, and proposal planning expenses extending well beyond the scope of the original Bush Foundation planning grant, including one year of 1.5 FTE in staffing costs and \$5,000 in outside evaluator consulting fees.

University of Minnesota System	Year One	Year Two	Year Three	Three- Year Total
UM-Twin Cities	\$183,812	\$182,704	\$191,485	\$558,000
UM-Duluth	60,000	60,000	60,000	180,000
UM-Morris	36,333	34,333	49,334	120,000
UM-Crookston	32,499	35,437	34,064	102,000

Outside evaluation consultant	10,000	10,000	10,000	30,000
Total Request	\$322,644	\$322,474	\$344,883	\$990,000
U of M system in-kind contributions:				
.05 FTE Carol Carrier,				
.05 FTE W. Andrew Collins,				
.05 FTE Robert Jones,				
.15 FTE Jan Smith,				
proposal planning expenses including 1.5 FTE for one year and outside evaluator consulting fees				

BIBLIOGRAPHY

Aggarwal, A. K., & Bento, R. (2000). Web-based education. *In Learning and Teaching Technologies: Web-Based Opportunities and Challenges*, (pp. 2-16). Hershey, PA: Idea Group Publishing.

Austin, A.E., & Baldwin, R.G. (1991). *Faculty Collaboration: Enhancing the Quality of Scholarship and Teaching*. ASHE-ERIC Higher Education Report, 7. Washington, D.C.: The George Washington University, School of Education and Human Development.

Barr, R. B., & Tagg, J. (1995). From teaching to learning: A new paradigm for undergraduate education. *Change: The Magazine of Higher Learning*, 27, 6 (pp. 12-25).

Bland, C. J. & Bergquist, W. H. (1997). *The Vitality of Senior Faculty Members: Snow on the Roof-Fire in the Furnace*. ASHE-ERIC Higher Education Report, 25, 7. Washington, D.C.: The George Washington University, School of Education and Human Development.

Blyth, C. S. (2000). Enhancing the study of foreign language with technology: A CD-ROM and companion web site for first-year French. In D. G. Brown (ed.), *Interactive Learning: Vignettes from America's Most Wired Campuses* (pp.. 258-260). Boston, MA: Anker Publishing

Borkowski, E. Y., Henry, D., Larsen, L. L., & Matelik, D. (1997). Supporting teaching and learning via the web: Transforming hard-copy linear mindsets into web-flexible creative thinking. *Journal of Network and Computer Applications*, 20.

Brown, D. G. (ed.). (2000). *Interactive Learning: Vignettes from America's Most Wired Campuses*. Boston, MA: Anker Publishing.

- Campbell, W. E. & Smith, K. A. (eds.). (1997). *New Paradigms for College Teaching*. Edina, MN: Interaction Book Company.
- Carlson, H., Hilsen, L., O'Brien, M., & Peterson-Perlman, D. (1996). A partnership model for improving teaching and learning: Step one: Building the database. *Journal of Staff, Program, and Organizational Development*, 13, 4.
- Cole, R.A. (2000). *Issues in Web-Based Pedagogy: A Critical Primer*. Westport, Connecticut: Greenwood Press.
- Daugherty, M., Grubb, A., Hirsch, J., & Gillis, H. L. L. (2000). The scholarship of web-based teaching. In Robert A. Cole (ed.), *Issues in Web-Based Pedagogy: A Critical Primer*. Westport, Connecticut: Greenwood Press.
- Dekker, M. L., Schulman, M., Blandy, C. (2000). The selection and implementation of a web course tool at the University of Texas at Austin. In L. A. Petrides (ed.), *Case Studies on Information Technology in Higher Education: Implications for Policy and Practice* (pp. 66-75). Hershey, PA: Idea Group Publishers.
- de Verneil, M. & Berge, Z. L. (2000). Going online: Guidelines for faculty in higher education. *Educational Technology Review*, 13.
- Dennis, K.S. (2000). Creating an environment for successful technology integration. In Robert A. Cole (ed.), *Issues in Web-Based Pedagogy: A Critical Primer*. Westport, Connecticut: Greenwood Press.
- Duffy, T. M., & Cunningham, D. J. (1996). Constructivism: Implications for the design and delivery of instruction. In D. Johnassen (ed.), *Handbook of Research for Educational Communications and Technology*. New York: Macmillan Library Reference.
- Dusick, D.M. (1998). What social cognitive factors influence faculty members' use of computers for teaching? A literature review. *Journal of Research on Computing in Education*, Winter.1998.
- Falk, R. H. (2000). Science education for hostile non-science majors. In D. G. Brown (ed.), *Interactive Learning: Vignettes from America's Most Wired Campuses* (pp. 93-95). Bolton, MA: Anker Publishing Company.
- Feldman, Kenneth A., & Paulsen, Michael B. (1999). *Faculty Motivation: The Role of a Supportive Teaching Culture*. New Directions for Teaching and Learning, 78, Summer, 71-78.
- Gillani, B.B. (2000). Using the web to create student-centered curriculum. In Robert A. Cole (ed.), *Issues in Web-Based Pedagogy: A Critical Primer*. Westport, Connecticut: Greenwood Press.
- Grasha, A.F. (1996). *Teaching With Style: Enhancing Learning by Understanding Teaching and Learning Styles*. Pittsburgh, PA: Alliance Publishers.
- Grasha, A. F. & Yangarber-Hicks. N. (2000). Integrating teaching styles and learning styles with instructional technology. *College Teaching*, 48, 1.
- Jonassen, D. H. Carr, C. & Yueh, H-P. (1998). Computers as mindtools for engaging learners in critical thinking. *Techtrends*, March 1998.

Kashy, E., Thoennessen, M., Tsai, Y., Davis, N. E., & Albertelli III, G. (2000). Melding network technology with traditional teaching: Enhanced achievement in a 500-student course. In D. G. Brown (ed.), *Interactive Learning: Vignettes from America's Most Wired Campuses* (pp 51-55). Bolton, MA: Anker Publishing Company.

Kirkpatrick, D. (1998). *Evaluating Training Programs: The Four Levels* (Second Edition). San Francisco: Barrett-Koehler.

Licklider, B. L., Schnelker, D. L., & Fulton, C. (1997). Revisioning faculty development for changing times: The foundation and framework. *Journal of Staff, Program and Organizational Development*, 15, 3, (pp. 121-33).

Lim, D. (2000). Fostering a technology cultural change: The changing paradigms at the University of Minnesota-Crookston. In L. A. Petrides (ed.), *Case Studies on Information Technology in Higher Education* (pp. 240-245). Hershey: Idea Group Publishing.

Maddux, C.D., Cummings, R., & Torres-Rivera, E. (1999). Facilitating the integration of information technology into higher education instruction. *Educational Technology*, May-June 1999.

Nasseh, B. (2000). Forces of change: The emergence of a knowledge society and new generations of learners. In L. Petrides (ed.), *Case Studies on Information Technology in Higher Education*. Hershey: Idea Group Publishing.

Palmer, P. (1993). Good talk about good teaching: Improving teaching through conversation and community. *Change: The Magazine of Higher Learning*, 6, (pp. 8-14).

Rogers, D.L. (2000). A paradigm shift: Technology integration for higher education in the new millenium. *Educational Technology Review*, 13.

Ross, J. L. & Schulz, R. A. (1999). Using the world wide web to accommodate learning style diversity in the college classroom. *College Teaching*, 47, 4.

Shulman, L. (1993). Teaching as community property: Putting an end to pedagogical solitude. *Change: The Magazine of Higher Learning*, 6 (pp. 6-7).

Teichel, R. S., (2000). Computer-enhanced teaching of cell and molecular biology. In D. G. Brown (ed.), *Interactive Learning: Vignettes from America's Most Wired Campuses* (pp. 105-108). Bolton, MA: Anker Publishing Company.

Tennyson, R. D., (1994). The big wrench versus integrated approaches: The great media debate. *Educational Technology Research and Development*, 42, 3.

Webb, B., Newman, D. R., Cochrane, C. (1994). The role of computers in improving student learning: Towards a methodology for evaluating the quality of student learning in a computer-mediated-conferencing environment. In G. Gibbs (ed.), *Improving Student Learning: Theory and Practice*. Oxford: Oxford Centre for Staff Development.

Weimer, M. (1990). *Improving College Teaching: Strategies for Developing Instructional Effectiveness*. San Francisco: Jossey-Bass.

Weinstein, C. E. (1999). Teaching students how to learn. In MacKeachie, W. J., *Teaching Tips: Strategies, Research, and Theory for College and University Teachers*, (pp.312-325). Boston: Houghton Mifflin Company.

Wollaeger, M. A. (2000). Synchronous and nonsynchronous exchange in basic and advanced English classes. In D. G. Brown (ed.), *Interactive Learning: Vignettes from America's Most Wired Campuses* (pp. 234-237). Bolton, MA: Anker Publishing Company.

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